

REMARKS

This paper is responsive to an Official Action that issued in this case on February 24, 2005.

In the Action, the Office:

- Rejected claims 7-13 and 15-23 under 35 USC §102 as being anticipated by U.S. Pat. No. 6,427,967 to Evans.
- Rejected claims 14 and 24 under 35 USC §103 as being obvious over Evans in view of U.S. Pat. No. 5,199,462 to Baker.
- Rejected claims 9-14 under 35 USC §112, ¶2 as being indefinite.
- Objected to the Abstract of the Disclosure for several informalities.

Responsive to the Action, applicant hereby amends claims 7-10, 12, 13, 15-17, 19, 20, and 24. Furthermore, the applicant has provided a replacement Abstract. Reconsideration is respectfully requested in view of the foregoing amendments and the following remarks.

1. The Office objected to the Abstract because it is allegedly too long and includes improper language such as "comprises," "is disclosed," and the like. The Abstract is hereby amended, and is believed to satisfy the objections that have been raised by the Office. As a consequence, the Office is requested to withdraw the objections to the amended Abstract.

2. The Office objected to claim 9-14 as being indefinite. In particular, original claim 9 recites that the first end of the rotor does not contact a seating surface when it blocks a gas inlet port that communicates with the chamber in which the rotor resides. The Office alleges that this is not correct since "otherwise the valve would not work."

The Office is incorrect; this lack of contact with a seating surface is a key feature of the invention. For example, when the rotor is positioned to block the inlet port and unblock the vent port, the pressure in the control volume will drop to closely approximate the vent pressure. This is because the in-flow leakage is significantly smaller than the (unblocked) vent flow area. And while it's hard to provide sufficient resolution in the drawings to show this, this feature is clearly described in the specification. In particular:

See paragraph [0015] of the Summary, at which it is stated:

It is also notable that there is no contact between the rotor (i.e., the valve element) and a seat surface. That is, a slight amount of leakage is permitted and expected.

See paragraph [0045] of the Detailed Description, at which it is stated:

Unlike most valves, a slight amount of leakage is permitted and expected in pilot valve 210. The leakage occurs since rotor 228 does not contact a "seat" when it blocks inlet port 222 or vent port 226. To keep the leakage low, rotor 228 and chamber 220 should be manufactured with high precision so that there is a very small gap between end 230 of rotor 228 and gas inlet port 222 and end 232 of rotor 228 and gas vent port 226. In some embodiments, the gap between an end of rotor 228 (i.e., first end 230 and second end 232) and the interior wall of chamber 220 near inlet and vent ports is about 0.0005 inches. Leakage in an amount of about 10 percent or less (volumetric flow) is readily achievable and will be acceptable in most cases. As previously disclosed, the amount of flow entering pilot valve 210 is quite small such that the actual amount of leakage is a very small quantity of gas.

See paragraph [0049] of the Detailed Description, at which it is stated:

By way of summary, illustrative pilot valve **210**, and multi-stage valves that incorporate it (e.g., HGCV **208**, etc.) incorporate a number of distinctive features that provide a number of benefits. For example, illustrative pilot valve **210** incorporates the following features:

... There is no contact between rotor **228** and a seat surface.

As a consequence of these and other features, some embodiments of pilot valve **210** and multi-stage valves that incorporate it offer at least some of the following advantages:

They do not lift against a pressure load.

They are substantially insensitive to g-loads.

They are immune from pressure imbalances.

They require little actuation force (hence low electromagnetic power consumption).

They have pneumatically-assisted actuation.

Leakage of a small amount of gas past a "blocked" port is a key reason why the rotary-valve arrangement claimed by applicant does not suffer from the problems experienced by many prior art valves. In particular, the claimed valve does not lift against a pressure load, is immune from pressure imbalances, requires little actuation force, and has pneumatically-assisted actuation.

It is perhaps worth noting that the valve has been built by the applicant and, in fact, works.

Since the claim language in issue is supported by the specification and is correct, the Office is requested to withdraw its Section 112, paragraph 2 rejection of claims 9-14.

Applicant will of course comply with any request from the Office to amend the drawings to more clearly depict this feature, if so requested.

The Applicant notes that all of the independent claims have been amended to recite, in varying language, this feature; that is, leakage past the "blocked" port.

3. The Office rejected claims 7-13 and 15-23 as being anticipated by Evans. All of applicant's amended independent claims (*i.e.*, 7, 9, 15, 24) recite a chamber having three ports and a rotor within the chamber. A region that Evans alternatively refers to as "upper diaphragm control chamber (10)" or "upper valve chamber (10)" certainly seems to qualify as a "chamber." But there is no rotor in this region. Rather, Evans places a three-way, two-position rotary valve within "porting (8)" at the confluence of the porting and a line leading to "chamber (10)."

The region where Evans places his rotary valve is not a chamber. Evans doesn't call it a chamber nor does the dictionary definition of "chamber" comport with such a characterization. The valve is at the confluence of the inlet port, the vent port, and the control volume port.

Furthermore, independent claims 7 and 15 have been amended to recite that "no two of said ports are contiguous with one another." In the illustrative embodiment depicted in the Figures, two of the ports are at the extreme ends of the chamber and the third is disposed between them.

In Evans, the inlet port is contiguous with the control volume port. Similarly, the vent port is contiguous with the control volume point. Referring to Figure 3 of Evans, it is clear that by virtue of the arrangement that is described therein and above, the rotary valve (9) is lifting against pressure (*i.e.*, the pressure within chamber 10) when it pivots to couple chamber (10) to the "vent port" (*i.e.*, heading toward drain 33).

Also, amended independent claims 7, 9, 15, and 24 recite, in varying language, a limitation pertaining to the fact that the rotor does not seat against the chamber, such that leakage through the "closed" port (*i.e.*, the gas inlet port or the gas vent port) is routinely and predictably occurring.

There is no disclosure or suggestion in Evans that there should be leakage or non-seating of the rotary valve.

The features recited in applicant's amended independent claims, in particular, (1) the relative locations of the ports, and (2) the leakage through the ports, are responsible, in large part, for the fact that:

- the rotor doesn't lift against a pressure load;
- the apparatus is substantially insensitive to g-loads;
- the apparatus is substantially immune from pressure imbalances;
- the rotor requires very little actuation force; and
- actuation of the rotor is pneumatically-assisted.

Since Evans does not disclose a chamber containing a rotor, nor does Evans disclose a chamber having three ports wherein no two of the ports are contiguous, nor does Evans disclose that there should be leakage or non-seating of the rotary valve, applicant's amended independent claims 7, 9, 15, and 24 are allowable over Evans. Claims 8, 10-14, and 16-23 are allowable based on their dependence on one of the allowable base claims, in addition to reciting further patentable features. As a consequence, applicant requests that the Office withdraw the Section 102 rejections of the claims over Evans.

4. The Baker patent is cited in support of a rotary valve rotating less than 10 degrees. This feature does not appear in the independent claims. There is no disclosure in Baker and Evans that, combined, suggests applicant's claimed invention. As such, the Office is requested to withdraw its Section 103 rejections of claims 14 and 24.

Conclusion

It is believed that claims 7-24 now presented for examination are allowable over the art of record. A notice to that effect is solicited.

Respectfully,
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